Attorney Docket No. 20863.00

IN THE APPLICATION

OF

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FOR A

CARTRIDGE AND CHAMBER FOR FIREARM

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CARTRIDGE AND CHAMBER FOR FIREARM

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. Provisional Patent Application Serial No. 60/419,537, filed October 21, 2002.

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

The present invention relates to a cartridge and a chamber for a firearm, in particular a cartridge and chamber for a handgun or rifle adapted to fire a bullet with an outside diameter of about 0.223 inches (").

2. DESCRIPTION OF RELATED ART

Prior art firearms which fire bullets with an outside diameter of about 0.223" often require the use of a relatively large firearm with a relatively large cartridge and chamber. Specifically, the diameter of the cartridge and chamber is often greater than 0.400" and/or the length of the cartridge is often

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greater than 1.000". Also, the neck and shoulder of prior art cartridges and chambers are typically provided at such an angle that the cartridge does not feed properly from the magazine into the barrel. These problems result in a slow round. In other words, it takes a comparatively long time for the round to advance from the magazine to the barrel upon pulling the trigger. Further, the dimensions of the cartridge and chamber result in wear and tear on the firearm. For instance, upon firing, some prior art cartridges are found to peen or damage the metal on the locking lugs. In addition, the prior art chambers and cartridge are typically capable of achieving a limited bullet velocity.

A variety of cartridges and chambers for 0.223" bullets have been proposed, all of which have one or more of the problems identified above. U.S. Patent No. 5,033,386, issued July 23, 1991 to Vatsvog, describes a composite cartridge for a 0.223 caliber high velocity rifle. The outside diameter of the Vatsvog cartridge at its widest point is 0.398". The length and shoulder angle of the Vatsvog cartridge are not discussed.

U.S. Patent Nos. 5,970,879 issued October 26, 1999 and 6,354,221 B1 issued March 12, 2002, both to Jamison, describe high-power firearm cartridges. Both Jamison patents are directed to a cartridge in a first embodiment with an overall length **L** of about 2.2", a shoulder angle of approximately 35°,

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and a diameter **D** of between about 0.53 and 0.54", and a cartridge in a second embodiment with an overall length **L** of about 1.7", a shoulder angle of at least 30° but less than 40°, and most preferably approximately 35°, and a diameter **D** of at least about 0.45", and preferably 0.533". Independent claims 1 and 3 of the '879 patent are specifically limited to a cartridge with a diameter of at least 0.53" and 0.45", respectively. Independent claim 2 of the '879 patent discloses a cartridge longer than 1.25", since the claim requires a first portion having an outside diameter at a location 1.25" from the first end. The independent claims of the '221 patent disclose similar limitations. Cartridges with a shorter length, a smaller shoulder angle, or a smaller diameter are not taught or suggested by the Jamison patents.

U.S. Patent No. 6,293,203 B1, issued September 25, 2001, to Alexander et al., describes a cartridge for a 5.56 millimeter (mm) (0.224") projectile. Although the independent claims of the Alexander patent recite a limit velocity not less than 518 meters per second (m/s), or 1,700 feet per second (fps), Fig. **5** of the Alexander patent shows a maximum limit velocity of about 2,000 fps. The angle **y** of the Alexander patent is not claimed, but is disclosed to be 32° in the preferred embodiment. The preferred embodiment of Alexander has a cartridge with an outside diameter **A** of 10.80 mm (0.425"). There is no teaching

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or suggestion in Alexander for a limit velocity of greater than 2,000 fps, an angle of less than 32°, or an outside diameter of less than 10.80 mm (0.425").

None of the above inventions and patents, taken either singly or in combination, is seen to describe the instant invention as claimed.

SUMMARY OF THE INVENTION

The present invention is directed to a cartridge and a chamber for a firearm. The firearm may be a handgun or a rifle. Specifically, the cartridge and chamber are adapted for use with a firearm adapted to fire a bullet with an outside diameter of about 0.223" (also known as a 223 round). The cartridge comprises an axis, a neck, a shoulder, a body, and an extraction groove. The cartridge has a total length between 0.870 and 1.000". The first body outside diameter, which is the diameter of the body at its widest point, is about 0.375", ± 0.005". The shoulder may be formed at an angle between the body and the neck where the angle is about 28°, ± 3°, with respect to the axis of the cartridge. The total length, the first body outside diameter and the shoulder angle of the cartridge of the present invention are each smaller than many prior art cartridges. Upon

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firing a firearm equipped with the cartridge and chamber of the present invention, the bullet is capable of reaching a velocity of greater than about 2,500 fps.

The chamber of the present invention is provided for the cartridge, described above, where the cartridge has a total length between 0.870 and 1.000". The chamber is adapted for use with a handgun or rifle with a barrel bore adapted to fit the bullet with an outside diameter of 0.223". The barrel bore may be provided with a region adapted to fit the ogive of the bullet. The chamber comprises an axis, a neck bore, a shoulder bore, and a body bore. The first body bore inside diameter, which is the diameter of the body bore at its widest point, is about 0.376", ± 0.005". The shoulder bore may be formed at an angle between the body bore and the neck bore where the angle is about 28°, ± 3° with respect to the axis of the chamber. The total length, first body bore outside diameter and shoulder bore angle of the chamber of the present invention are each smaller than many prior art cartridges. Upon firing a firearm equipped with the cartridge and chamber of the present invention, the bullet is capable of reaching a velocity of greater than about 2,500 fps.

Accordingly, it is a principal object of the invention to provide a cartridge for a bullet with an outside diameter of about 0.223".

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It is another object of the invention to provide a chamber for a cartridge for a bullet with an outside diameter of about 0.223".

It is an object of the invention to provide improved elements and arrangements thereof in an apparatus for the purposes described which is inexpensive, dependable and fully effective in accomplishing its intended purposes.

These and other objects of the present invention will become readily apparent upon further review of the following specification and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The sole Figure is a side view of a cartridge and a chamber for a firearm according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in the sole Figure, the present invention is directed to a cartridge **10** and a chamber **100** for a firearm. The firearm may be a handgun or a rifle, as described in detail below. Specifically, the cartridge **10** and chamber **100** are adapted for use with a firearm adapted to fire a bullet **200** with

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an outside diameter D_1 of about 0.223" (also known as a 223 round).

The cartridge **10** comprises an axis **20**, a neck **30**, a shoulder **40**, a body **50**, and an extraction groove **60**. The cartridge **10** has a total length L_3 that may be between 0.870 and 1.000". The cartridge **10** is typically made of brass, but may also be made of iron, plastic, or other suitable types of metal. One advantage to using a brass cartridge is that, after firing, the cartridge may be resized and reused.

The body **50** is hollow and generally cylindrical with a closed end opposite the bullet **200**. The body **50** comprises a first body outside diameter D_4, a second body outside diameter D_3, a body length L_1, and the extraction groove **60**. The first body outside diameter D_4, which is the diameter of the body **50** at its widest point, is about 0.375", ± 0.005". The second body outside diameter D_3 is less than or equal to the first body outside diameter D_4. In other words, the body **50** may be cylindrical with ends that are of the same diameter, or the body **50** may be tapered. If the body **50** is to be tapered, the second body outside diameter D_3 may be about 0.367", ± 0.005". The ratio of the first body outside diameter D_4 to the outside diameter D_1 of the bullet **200** is between 1.66 to 1 and 1.70 to 1. In a preferred embodiment of the invention, the ratio is 1.67 to 1.

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The cartridge **10** is formed using a customized sizing die (not shown) provided in a corresponding size and shape which is adapted to form the cartridge **10** as described herein.

The body length L_1 is measured from the terminal end of the body **50** on the end opposite the bullet **200** (left side of the Figure) to the intersection of the body **50** with the shoulder **40**. The body length L_1 is between 0.670 and 0.800". In a first preferred embodiment of the invention, identified by the inventor as the PK224 cartridge, the body length L_1 is about 0.675", ± 0.005", the axial length L_2 of the body **50** and the shoulder **40** is about 0.775", ± 0.005", and total length L_3 is about 0.875". In a second preferred embodiment of the invention, identified by the inventor as the PK2224 cartridge, the body length L_1 is about 0.735", ± 0.005", the axial length L_2 of the body **50** and the shoulder **40** is about 0.835", ± 0.005", and total length L_3 is about 0.935", ± 0.005". In a third preferred embodiment of the invention, identified by the inventor as the PK224S or PK224 Super cartridge, the body length L_1 is about 0.795", ± 0.005", the axial length L_2 of the body **50** and the shoulder **40** is about 0.895", ± 0.005", and total length L_3 is about 0.995", ± 0.005".

The neck **30** is hollow and generally cylindrical provided on the terminal end of the cartridge **10** adjacent to the bullet **200** (right side of the Figure). The neck **30** has a neck outside

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diameter D_2 of about 0.260", ± 0.005". The neck **30** is adapted to fit the bullet **200**.

The shoulder **40** is hollow and conical provided between the body **50** and the neck **30**. The shoulder **40** may be formed at an angle α between the body **50** and the neck **30** where the angle α is about 28°, ± 3°, with respect to the axis **20** of the cartridge **10**. The angle α of the shoulder **40** is shallower than many prior art cartridges. The shallower angle of the present invention is desirable in that it promotes proper feeding of the cartridge **10** from the magazine of the firearm and reduces damage to the metal on the locking lugs of the firearm.

For the sake of comparison, a standard 9 mm handgun is capable of firing a bullet at about 1,000 fps. Upon firing a handgun provided with the cartridge **10** of the present invention as described above, the bullet **200**, for example, a 35 grain 0.223" bullet, is capable of reaching a velocity of greater than about 2,500 fps. When used with a rifle, the bullet **200** is capable of reaching a velocity of greater than about 3,000 fps.

The present invention is also directed to a chamber **100** for the cartridge **10** (described above) with a total length L_3 between 0.870 and 1.000" for a bullet **200** with an outside diameter of about 0.223". The chamber **100** is adapted for use with a handgun or rifle with a barrel bore **120** adapted to fit the bullet **200**. The barrel bore **120** has an inside diameter D_5 of about 0.224".

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The barrel bore **120** may be provided with a region **130** adapted to fit the ogive of the bullet **200**. The chamber **100** comprises an axis **110**, a neck bore **140**, a shoulder bore **150**, and a body bore **160**.

The chamber **100** is formed using a customized chamber reamer (not shown) provided in a corresponding size and shape that is adapted to form the chamber **100** as described herein. The chamber reamer may be provided with five or six flukes. The flukes of the chamber reamer may be straight.

The body bore **160** is generally cylindrical with open ends. The body bore **160** comprises a first body bore inside diameter D_8, a second body bore inside diameter D_7, and a body bore length L_4 adapted to receive the cartridge **10**. The first body bore inside diameter D_8, which is the diameter of the body bore **160** at its widest point, is about 0.376", ± 0.005". The second body bore inside diameter D_7 is less than or equal to the first body bore inside diameter D_8. In other words, the body bore **160** may be cylindrical with ends that are of the same diameter, or the body bore **160** may be tapered. If the body bore **160** is to be tapered, the second body bore inside diameter D_7 may be about 0.368", ± 0.005". The ratio of the first body bore inside diameter D_8 to the outside diameter D_1 of the bullet **200** is between 1.65 to 1 and 1.70 to 1. In a preferred embodiment of the invention, the ratio is 1.68 to 1.

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The body bore length L_4 is measured from the terminal end of the body bore **160** on the end opposite the bullet **200** (left side of the Figure) to the intersection of the body bore **160** with the shoulder bore **150**. The body bore length L_4 is sufficient in length to receive the cartridge **10**, which as noted above, has a cartridge body length L_1 between 0.670 and 0.800". In a first preferred embodiment of the invention, the chamber **100** is adapted to receive the PK224 cartridge, and the body bore length L_4 is adapted to receive the cartridge **10** where the cartridge body length L_1 is about 0.675", ± 0.005", the axial length L_2 of the body **50** and the shoulder **40** is about 0.775", ± 0.005", and total length L_3 is about 0.875". In a second preferred embodiment of the invention, the chamber **100** is adapted to receive the PK2224 cartridge, and the body bore length L_4 is adapted to receive the cartridge **10** where the cartridge body length L_1 is about 0.735", ± 0.005", the axial length L_2 of the body **50** and the shoulder **40** is about 0.835", ± 0.005", and total length L_3 is about 0.935", ± 0.005". In a third preferred embodiment of the invention, the chamber **100** is adapted to receive the PK224S cartridge, and the body bore length L_4 is adapted to receive the cartridge **10** where the cartridge body length L_1 is about 0.795", ± 0.005", the axial length L_2 of the body **50** and the shoulder **40** is about 0.895", ± 0.005", and total length L_3 is about 0.995", ± 0.005".

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The neck bore **140** is generally cylindrical provided on the end of the chamber **100** adjacent to the bullet **200** (right side of the Figure). The neck bore **140** has a neck bore inside diameter D_6 of about 0.261", ± 0.005".

The shoulder bore **150** is conical and provided between the body bore **160** and the neck bore **140**. The shoulder bore **150** may be formed at an angle α between the body bore **160** and the neck bore **140** where the angle α is about 28°, ± 3° with respect to the axis **110** of the chamber **100**. The angle α of the shoulder bore **150** is shallower than many prior art chambers. The shallower angle of the present invention is desirable in that it promotes proper feeding of the cartridge **10** from the magazine into the chamber **100** of the firearm and reduces damage to the metal on the locking lugs of the firearm.

As noted above, the chamber **100** is adapted for use with the cartridge **10**. Likewise, as described in detail above, the chamber **100** is adapted for use with a variety of handguns and rifles. A standard 9 mm handgun is capable of firing a bullet at about 1,000 fps. When using a firearm equipped with the chamber **100** and cartridge **10** of the present invention, the bullet **200** is capable of reaching a velocity of greater than about 2,500 fps. When using a rifle equipped with the chamber **100** and cartridge **10** of the present invention, the bullet **200** is capable of reaching a velocity of greater than about 3,000 fps.

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The cartridge **10** and chamber **100** of the present invention may be adapted for use with any handgun. For example, the cartridge **10** is adapted for use with the following handguns: Colt 2000, Ruger P85, Ruger P95, military Beretta 92, Glock 17, and a 45 caliber handgun chambered to fire a 223 round. A standard double stack magazine for a 9 mm handgun accepts the cartridge **10** of the present invention without modification to the magazine. The cartridge **10** and chamber **100** of the present invention result in a significantly faster round when compared to the prior art. In other words, it takes a comparatively short time for the round of the present invention to advance from the magazine to the barrel upon pulling the trigger. In using the cartridge **10** and chamber **100** of the present invention with a 9 mm handgun, there is less recoil, less muzzle jump, better control, the user is back on target quicker, and the handgun is generally much faster as compared to a conventional 9 mm handgun.

The cartridge **10** and chamber **100** of the present invention may also be adapted for use with any rifle that accepts a 223 round. For example, the cartridge **10** and chamber **100** of the present invention have been used with a Colt civilian model AR15 rifle that was converted to a pump type rifle. The AR15 is similar to a military M16 rifle. A standard AR15 is chambered for the Remington 223. When used with a rifle, the cartridge **10**

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and chamber **100** of the present invention are capable of firing a bullet at about 3,000 fps. Accuracy is also improved by using the cartridge **10** and chamber **100** of the present invention. For example, at 300 feet, the inventor was able to place 7 rounds into a 3/8" shot pattern.

It is to be understood that the present invention is not limited to the sole embodiments described above, but encompasses any and all embodiments within the scope of the following claims.

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